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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,509	05/02/2005	Erik Petrus Antonius Maria Bakkers	NL 021132	4331

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P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER	
KALAM, ABUL	

ART UNIT	PAPER NUMBER
2814	

MAIL DATE	DELIVERY MODE
08/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/533,509	BAKKERS ET AL.	
	Examiner	Art Unit	
	Abul Kalam	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 May 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/2/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election

1. Applicant's election of Group I embodied in claims 1-9, in the reply filed on May 21, 2007 is acknowledged. Because applicant did not distinctly and specifically point out any errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Furthermore, note that Applicant has cancelled non-elected claims 10-13 from further consideration.

Drawings

2. Figure 1a should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 2-7 and 9 are objected to because of the following informalities:

In line 1 of claims 2-6, the limitation of "A nanostructure" should be amended to recite --The nanostructure--.

In line 1 of claim 7, the limitation of "A dispersion of nanostructures" should be amended to recite --A dispersion of at least one nanostructure--.

In line 1 of claim 9, the limitation of "An electronic device" should be amended to recite --The electronic device--.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 2 of claim 4, the limitation of "the compound semiconductor material" is unclear and ambiguous, because there is insufficient antecedent basis for this limitation in the claim. For examination purposes, claim 4 will be interpreted as "A nanostructure as claimed in claim 1, characterized in that the hollow core is partially filled with a semiconductor material."

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 1, 6 and 8** rejected under 35 U.S.C. 102(e) as being anticipated by Tsukagoshi et al. (US 6,833,980, hereinafter, Tsukagoshi).

With respect to **claim 1,** Tsukagoshi teaches a nanostructure of an inorganic semiconductor material **(col. 6: lns. 24-27)**, characterized in that the nanostructure comprises a nanotube **(col. 3: lns. 47-55)** with a crystalline mantel and a hollow core. Regarding the limitation of "a crystalline mantle" it is inherent that silicon and carbon nanotubes have a crystalline structure **(Lee et al. (US 2004/0255652): [0010])**.

With respect to **claim 6,** Tsukagoshi teaches wherein the inorganic semiconductor material is chosen from the group of III-V semiconductor materials **(col. 6: lns. 24-27)**.

With respect to **claim 8,** Tsukagoshi teaches An electronic device comprising a first and second electrode **(3 and 4, Fig. 1; col. 3: lns. 26-42)** which are mutually connected through at least one nanostructure **(col. 3: lns. 43-55)** according to claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. **Claims 2 and 3** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukagoshi ('980).

With respect to **claims 2 and 3**, Tsukagoshi teaches all the limitations of claim 1, including wherein the nanotube has a diameter in the range of 1.4-2.0 nm. However, Tsukagoshi does not explicitly disclose wherein the hollow core of the nanotube has a diameter in the range of 2 and 20 nm, nor wherein the mantle of the nanotube has a thickness in the range of 1-20 nm.

However, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 234 (CCPA 1955). Furthermore, where patentability is based upon particular chosen range or dimension recited in a claim, the Applicant must show that the chosen range or dimension is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the hollow core with a diameter and the mantle with a thickness, in such a range as claimed, because the range is not critical since it can be optimized depending on the desired properties of the nanotube.

7. **Claim 4** (as best understood by the Office) is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukagoshi ('980) in view of Chen et al. (US 2003/0129122, hereinafter, Chen).

With respect to **claim 4**, Tsukagoshi teaches all the limitations of the claim, as set forth above in claim 1, with the exception of disclosing wherein the hollow core is partially filled with a semiconductor material.

However, Chen teaches that nanotubes filled with metals or semiconductors may provide components for nanoscale electrical or electronic devices **(¶ [0004])**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the nanostructure of Tsukagoshi with the teaching of Chen, to fill the nanotubes with semiconductor material, in order to form a variety electrical components **(¶ [0004])**.

8. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukagoshi ('980) in view of Crespi et al. (US 2004/0004212, hereinafter, Crespi).

With respect to **claim 5**, Tsukagoshi teaches all the limitations of the claim, as set forth above in claim 1, with the exception of disclosing wherein the nano structure comprises a first zone with a p-type doping and a second zone with an n-type doping, the first and second zones having a mutual interface constituting a pn-junction.

However, Crespi teaches a nanostructure in which nanotube sections can be doped to form a pn-junction **(¶ [0044])**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the nanostructure of Tsukagoshi with the teaching of

Crespi, to form a nanotube comprising a pn-junction, in order to provide elements to manufacture nanoscale semiconductor devices **(¶ [0099])**.

9. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukagoshi ('980) in view of Glatkowski et al. (US 2004/0071949).

With respect to **claim 7**, Tsukagoshi teaches all the limitations of the claim as set forth above in claim 1, with the exception of disclosing a dispersion of nanostructures in a solvent.

However, Glatkowski teaches that a nanotube-containing layer may be easily formed and applied as a dispersion of nanotubes in a solvent **(¶ [0053])**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Tsukagoshi and Glatkowski, in order to form conformal coatings which comprise nanotubes, for the purpose of providing EMI shielding **(Glatkowski: ¶ [0017], [0033])**.

10. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukagoshi ('980) in view of Urayama et al. (US 6,650,061, hereinafter, Urayama).

With respect to **claim 9**, Tsukagoshi teaches all the limitations of the claim as set forth above in claim 1, with the exception of disclosing an electronic device characterized in that an insulating substrate with pores that are mutually substantially parallel is present, wherein the pores extending from a first electrode to a second electrode, wherein the nanostructure are provide in the pores.

However, Tsukagoshi discloses an electronic device comprising a first and second electrode **(2 and 7a, Fig. 1a-1b; col. 6: ln. 15)** connected through at least one

nanostructure **(6; col. 6: lns. 27-30)**, and an insulating substrate **(4; col. 6: lns. 18-21)** with pores **(5, Fig. 1b)** that are substantially parallel, wherein the nanostructures **(6)** are provided in the pores **(Fig. 1b)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Tsukagoshi and Urayama, in order to form an electronic device, such as an electron source array comprising very fine, uniform emitters **(Urayama: abstract)**.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is 571-272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ak

/Thao X Le/
Primary Examiner, Art Unit 2814